8, lines 1-5. No new matter has been entered.

The previously-presented claims 1-2, 4, 8, 10, 13 and 15-18 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,156,273 to Regnier et al. Applicants submit that the teachings of this reference do not teach or suggest the invention defined by the present claims.

Regnier et al. disclose a separation column including a number of side by side monolith support structures 14 defining a series of interconnected microchannels 12. The interconnected microchannels sequentially split and merge. The walls of the support structures comprise interactive surfaces for effecting chromatographic separation of an analyte. The coating can include anionic groups, cationic groups, hydrocarbon groups, chelation groups, antibodies and antigens. The interaction of the sample with the treated surfaces provides separation of the sample. The separation column can be driven by electroosmotic flow due to application of an electric field. An electric field 76 is applied to the channels for providing flow of a liquid inside the channels in the direction of the arrows shown in Fig. 4a (col. 9, line 43 - col. 10, line 18). The ratio of the overall surface area to the overall value of the channels (A/V ratio) is maximized by making the channels as long as possible.

In contrast to the invention defined by the present claims, Regnier et al. do not teach or suggest a microfluidic device for trapping polarizable particles by passing polarizable particles in the vicinity of a substrate bearing a plurality of constrictions each separated by a gap and applying a dielectrophoric field to the substrate in order to trap the polarizable particles in the gap. To the contrary, Regnier et al. teach flow of a sample through interconnected microchannels in which the flow can be driven by application of an electric field. There is no teaching or suggestion in Regnier et al. that a dielectrophoric field can be applied to trap polarizable particles in a gap between constrictions. Moreover, the flow of a sample in Regnier et al. is within a channel and there is no teaching or suggestion of the use of constrictions within the channel and trapping particles between constrictions. Instead, Regnier et al. teach away from the present invention by teaching coating of the walls with cationic groups, anionic groups, hydrocarbon groups, chelation groups, antibodies and antigens for effecting a specific analyte to be immobilized or entrapped in the channels. Accordingly, Regnier et al. do

not teach or suggest the use of a dielectrophoric field to trap polarizable particles. As described on page 6, line 29 - page 7, lines 1-3 of the application, the present invention permits efficient handling of minute samples in large numbers because the reactions occur while the sample is trapped between constrictions and it serves as a focusing locus at the constrictions. There is no teaching or suggestion of this operation in Regnier et al. Accordingly, the invention defined by the present claims is not anticipated by Regnier et al.

Claims 3 and 23 were rejected under 35 U.S.C. § 103 as obvious in view of Regnier et al. in combination with U.S. Patent No. 6,358,387 to Kopf-Sill et al.

Kopf-Sill et al. disclose an illumination and detection system for use in illuminating a plurality of samples in a plurality of microchannels. An excitation beam having two or more excitation wavelengths is focused onto the plurality of microchannels to simultaneously excite the samples in at least two of the channels so as to cause the samples to emit radiation. Detection optics direct the radiation with a specific radiation wavelength range to a corresponding detector. Positive pressure sources are coupled to various reagent supply reservoirs to drive material through channels of the device.

In contrast to the invention defined by the present claims, Kopf-Sill et al. do not teach or suggest a microfluidic device for trapping polarizable particles by passing polarizable particles in the vicinity of a substrate bearing a plurality of constrictions each separated by a gap and applying a dielectrophoric field to the substrate in order to trap the polarizable particles in the gap. Rather, Kopf-Sill, similar to Regnier et al. described above, teach microchannels, but do not teach or suggest a plurality of constrictions and trapping particles in a gap between the constrictions. Further, there is no teaching or suggestion in Kopf-Sill et al. of applying a dielectrophoric field to trap particles in a gap between the constriction, and Kopf-Sill et al. do not cure the deficiencies of Regnier et al. described above. Accordingly, the invention defined by the present claims is not obvious in view of Regnier et al. in combination with Kopf-Sill et al. since neither reference teaches or suggests trapping of a polarizable particle in a gap between constrictions by application of a dielectrophoric field.

Claims 5-7 and 9 were rejected under 35 U.S.C. § 103 as being obvious in view of Regnier et al. in combination with U.S. Patent No. 6,117,460 to Walters et al.

Walters et al. disclose a method of treating material with electrical fields and an added treating substance. A plurality of electrodes are arrayed around the material to be treated. Electrical pulses are applied in a computer-controlled sequence of at least three non-sinusoidal electrical pulses to electrodes in the array of electrodes, the electrical pulses are applied to a cuvette.

In contrast to the invention defined by the present claims, Walters et al. do not teach or suggest a microfluidic device for trapping polarizable particles by passing polarizable particles in the vicinity of a substrate bearing a plurality of constrictions each separated by a gap and applying a dielectrophoric field in order to trap the polarizable particles in the gap. Rather, Walters et al. teach the use of metal electrodes with the device to treat biological cells in order to induce pore formation within the cells. There is no teaching or suggestion of trapping polarizable particles upon application of a dielectrophoric fluid to a substrate, as defined by the present claims. Rather, Walters et al. teach the use of a plurality of electrodes around a material to be treated. Applicants submit that the use of metal electrodes in a microenvironment has the disadvantage of evolving a gas which renders the microenvironment unusable. In contrast to the present invention, electrodes are positioned on opposite edges of a substrate but are not in the microenvironment of the constrictions and do not have the disadvantage of Walters et al. of using metal electrodes in a microenvironment. Accordingly, the invention defined by the present claims is not obvious in view of Regnier et al. in combination with Walters et al. since neither reference teaches or suggests trapping of a polarizable particle in a gap between constriction by application of a dielectrophoric field.

Claims 11, 12 and 14 were rejected under 35 U.S.C. § 103 as being obvious in view of Regnier et al. in combination with U.S. Patent No. 5,427,663 to Austin et al.

Austin et al. disclose an electrophoresis device for sorting microstructures in a fluid medium. A substrate includes a receptacle having first and second ends and a pair of upstanding opposed side walls. A sifting means comprises a plurality of obstacles. An electric field induces the microstructures to migrate through the medium (Col. 10, lines 20-30). As the molecules migrate through the array of obstacles, the molecules can become hooked by the obstacles (Col. 6, lines 9-60 and Figs. 6-7).

In contrast to the invention defined by the present claims, Austin et al. do not

teach or suggest a microfluidic device for trapping polarizable particles by passing polarizable particles in the vicinity of a substrate bearing a plurality of constrictions each separated by a gap and applying a dielectrophoric field to the substrate in order to trap the polarizable particles in the gap. To the contrary, Austin et al. teach that the molecules are hooked onto obstacles. Moreover, Austin et al. do not teach or suggest that a dielectrophoric field can be used to trap particles in a gap between constrictions instead of the object itself. As described on page 7, lines 4-6 of the application, the present invention allows particles to be trapped and thereafter released upon no longer applying the dielectrophoric field. In contrast, the particles of Austin et al. are attached to the obstacles and are not released upon removal of the dielectrophoric field. Further, in Austin et al. an electric field is used to move microparticles through the microstructure. However, there is no teaching or suggestion in Austin et al. that a dielectrophoric field is applied for trapping of the particles.

With regard to claim 14, in the present invention the shape and cross section of the constriction can be used to adjust the dielectrophoric (DEP) force (page 12, line 30 - page 13, line 3). The trapezoidal shape with angled edges directs the polarizable particles into the gap between constrictions (page 11, lines 14-16). There is no teaching or suggestion in Austin et al. for varying the shape of the obstacles to adjust the DEP force or promote flow into a gap between obstacles. Accordingly, the invention defined by the present claims is not obvious in view of Regnier et al. in combination with Austin et al. since neither reference teaches or suggests trapping of a polarizable particle in a gap between constriction by application of a dielectrophoric field.

Claims 19-22 were rejected under 35 U.S.C. § 103 as obvious in view of Regnier et al. in combination with U.S. Patent No. 4,344,325 to Quake et al.

Quake et al. disclose a microfabricated device including a main channel with a sample inlet, a detection region and adjacent and downstream of the detection region a branch point discrimination region. An optical signal such as fluorescence from a reporter molecule associated with the polynucleotide molecule can be used to determine polynucleotide size or to direct selected polynucleotides into one or more channels of the

device.

In contrast to the invention defined by the present claims, Quake et al. do not teach or suggest a microfluidic device for trapping polarizable particles by passing polarizable particles in the vicinity of a substrate bearing a plurality of constrictions each separated by a gap and applying a dielectrophoric field to the substrate in order to trap the polarizable particles in the gap. Quake et al. similar to Regnier et al., teach a microchannel arrangement. However, Quake et al. do not teach or suggest a plurality of constrictions and trapping of particles within a gap between the constrictions by use of a dielectrophoric field. Accordingly, the invention defined by the present claims is not obvious in view of Regnier et al. in combination with Quake et al. since neither reference teaches or suggests trapping of a polarizable particle in a gap between constriction by application of a dielectrophoric field.

In view of the foregoing, Applicants submit that all pending claims are in condition for allowance and request that all claims be allowed. The Examiner is invited to contact the undersigned should she believe that this would expedite prosecution of this application. It is believed that no fee is required. The Commissioner is authorized to charge any deficiency or credit any overpayment to Deposit Account No. 13-2165.

Respectfully submitted,

Diane Dunn McKay
Reg. No. 34,586
Attorney for Applicant(s)

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MATHEWS, COLLINS, SHEPHERD & McKAY, P.A.
100 Thanet Circle, Suite 306
Princeton, New Jersey 08540-3662
Telephone: (609) 924-8555
Telecopier: (609) 924-3036

**VERSION WITH MARKINGS TO SHOW CHANGES**

In the Claims:

Claims 1 and 5-7 have been amended as follows:

1. (Amended) A microfluidic device for trapping polarizable particles comprising:

a substrate bearing a plurality of constrictions, each of said constrictions being separated from one another by a gap having a distance $D_1$;

means for passing said polarizable particles in the vicinity of said constrictions; and

means for applying a dielectrophoric field to said substrate,

wherein said polarizable particles are trapped in said gap [by] when said dielectrophoric field is applied.

5. (Amended) The device of claim [1] 4 wherein said electrical signal is an AC voltage at a predetermined frequency.

6. (Amended) The device of claim 5 wherein the [applied] predetermined frequency is between about 1 Hz and about 1 Ghz.

7. (Amended) The device of claim [1] 4 wherein said electrical signal is a DC voltage at a predetermined frequency.